Does the Demand Response to Transit Fare Increases Vary by Income?

Ian Savage and Caroline Miller
Why are we doing this?

• Mobility for lower income groups one of the justifications for subsidy
• Part of the political argument against fare increases, particular in flat-fare regimes
• But are lower-income groups actually more fare responsive?
What we are going to do

• Chicago Transit Authority (CTA) rail system
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• Look at change in boardings at non-downtown stations in the year after fare increases in 2004, 2006 and 2009
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• Look at change in boardings at non-downtown stations in the year after fare increases in 2004, 2006 and 2009
• See if ridership change varies in a systematic way with the per-capita income in the neighborhood around the station
Who are more fare sensitive?

Riders in lower-income neighborhoods

Riders in higher-income neighborhoods
Who are more fare sensitive?

Tighter budget constraint

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More options

Riders in higher-income neighborhoods
Who are more fare sensitive?

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Tighter budget constraint

More options

Small prior literature reflects this ambivalence

Riders in higher-income neighborhoods
• Looking at change in individual station entries in 12 months before and after a fare increase:
  – Jan-Dec 2004 versus Jan-Dec 2003
  – Jan-Dec 2006 versus Jan-Dec 2005
  – Apr-Dec 2009 versus Apr-Dec 2008 to allow for introduction of seniors ride free in March 2008
Also excluded:

Brown Line Branch
- 2005-2006
- 2008-2009

Fullerton to Belmont
- 2008-2009

Douglas Park Branch
- 2003-2004
- 2005-2006

Stations included on weekdays

2003-4: 99
2005-6: 86
2008-9: 95
More than just fares changed

<table>
<thead>
<tr>
<th></th>
<th>Fares Increased</th>
<th>Employment Changed</th>
<th>Gas Prices Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-4</td>
<td>+12.3%</td>
<td>+0.7%</td>
<td>+17.4%</td>
</tr>
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<td>2005-6</td>
<td>+20.5%</td>
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Fare (\$) vs. Station Entries

Demand Curve
Demand Curve

Fare ($) vs. Station Entries
Neighborhood data

- 2009 5-year (2005-9) American Community Survey
- Year 2000 Census Tracts
- Tracts that intersect half mile circle around each station
- For stations less than 1 mile apart, define a “watershed” halfway between them
Neighborhood data

• Income per Capita
• Population density (persons per square mile)
• Distance from downtown (N. Michigan Av. / E. Lake St)
• Proportion of males
• Proportion of ages 65+
• Proportion of children (0 – 14)

Generally (and surprisingly) a low correlation between these variables.
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Weekday boardings 2003-04

Income per Capita in Neighborhood Surrounding Station
Weekday boardings 2005-06

Income per Capita in Neighborhood Surrounding Station

$0 $10,000 $20,000 $30,000 $40,000 $50,000 $60,000 $70,000 $80,000
Weekday boardings 2008-09

Income per Capita in Neighborhood Surrounding Station
## Regression on change in boardings

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<tr>
<td>Income per capita</td>
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The bottom line

Weekday ridership change obtained from regression analysis holding population density, distance from downtown and proportions of males / seniors / kids at their mean values:

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Take aways

• These results might support the ambivalence found in the prior literature

• Some support that lower-income neighborhoods had a greater (negative) response to fare increases on weekdays

• Of course, in a flat-fare system, continuing riders from lower-income groups suffer a greater budget hit
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